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Project ID: 0506-EL-109

FY04 ARS Agreement #: 59-0790-4-098

Research Area: VDUN

Duration of Award: 1 Year

Project Title: Development of Durum Wheat Resistant to Fusarium Head Blight.

PROJECT 2 ABSTRACT

(1 Page Limit)

Fusarium head blight (FHB) caused by the fungus *Fusarium graminearum* Schwabe (telomorph *Gibberella zeae* (Schwein.) Petch. has been seriously attacking durum wheat (*Triticum turgidum* L. var. *durum*) in North Dakota and the surrounding states. There is continuous decline in harvested durum acreage and production in ND because of FHB. Fungicides may reduce the disease but the most environmentally safe and economical way to control the disease is with genetic resistance. Our objective is to develop FHB resistant durum wheat cultivars/germplasm with good agronomic and quality traits.

In previous studies we have identified 23 lines that have a moderate level of Type II resistance. Twenty of these lines are from crosses of adapted durum wheat germplasm with Sumai 3 and Wangshuibai, and the other three are from durum to durum crosses. We have evaluated these lines for agronomic and quality traits for two years. All these lines were ergonomically inferior to the checks and therefore none will be released as improved cultivars. We have developed several populations from crossing the best FHB resistant lines that have the Sumai 3 and Wangshuibai resistance with new ND released durum cultivars. F_{3,4} lines and subsequent generations from these populations are being evaluated for Type II resistance using the injection method and the microsatellite marker *Xgwm533*. Several lines from different populations will be evaluated as F_{5,6} lines for agronomic traits, quality, and disease resistance in 2005 yield trials. Selected lines will be evaluated further in 2006 as candidates for possible release.

In previous studies we have identified the Langdon *Triticum dicoccoides* 3A substitution line [LDN(DIC-3A)] to have a moderate level of Type II resistance. We have developed doubled haploids lines from crossing durum wheat cultivars to the LDN(DIC-3A) line. We have evaluated these lines for Type II resistance using the injection method and the microsatellite marker *Xgwm2* and for agronomic and quality traits in the Summer 2002 in preliminary yield trials grown at Prosper and Langdon, ND. Three resistant lines were selected and entered in the 2004 elite durum advanced trial. Selected lines from the elite durum advanced trial will be entered in the 2005 Uniform Regional Durum Nursery.

Fusarium head blight resistant lines that we identify will be evaluated for agronomic and quality traits at various locations in North Dakota. Lines that have good level of resistance and possess good agronomic and quality traits will be released as cultivars to the producers. Some of the identified resistant lines will be used as parents in crosses to generate a second cycle of breeding.